CLAIMS

What is claimed is:

1. A method for modeling a digitally simulated camera and lens comprising adjusting at least one camera and lens parameter of a plurality of camera and lens parameters in response to the adjustment of at least one other camera and lens parameter.

2. The method as set forth in claim 1, wherein the plurality of camera and lens parameters are selected from the group comprising field of view, lens focus, focal length, depth of field, hyper focal focus, camera aperture and aspect ratio.

3. The method as set forth in claim 1, wherein the at least one other camera and lens parameter is selected from the group comprising an aspect ratio and aperture and the at least one camera and lens parameter is selected from the group comprising hyper focal distance, hyper focal focus, near focus and far focus.

4. The method as set forth in claim 1, wherein the at least one other camera and lens parameter comprises focal length and the at least one camera and lens parameter is selected from the group comprising hyper focal distance, hyper focal focus, depth of field and field of view.

5. The method as set forth in claim 1, wherein the at least one other camera and lens parameter comprises focus and the at least one camera and lens parameter is selected from the group comprising focal length, near focus, far focus and field of view.

6. The method as set forth in claim 1, further comprising generating

a digital output representative of at least one camera and lens parameter of the plurality of camera and lens parameters.

7. The method as set forth in claim 1, further comprising generating a graphical display of a scene in accordance with a modeled camera and lens using the plurality of camera and lens parameters, wherein the display is updated as camera and lens parameters are adjusted.

8. A method for modeling a digitally simulated camera and lens comprising:

receiving at least one initial camera and lens parameters of a plurality of camera and lens parameters; and

generating at least one other camera and lens parameter of the plurality of camera and lens parameters using the at least one initial camera and lens parameter.

9. The method as set forth in claim 8, wherein the at least one initial camera and lens parameter is selected from the group comprising focal length, aperture and lens size and the at least one other camera and lens parameter comprising a field of view.

10. The method as set forth in claim 8, wherein the at least one initial camera and lens parameter comprises camera and lens parameters reflective of a real world camera and lens parameter and the step of generating generates camera and lens parameters to match the real world camera and lens.

11. The method as set forth in claim 8, wherein the plurality of camera and lens parameters are selected from the group comprising field of view, lens focus, focal length, depth of field, hyper focal focus, camera aperture and aspect ratio.

12. The method as set forth in 8, further comprising generating a digital output representative of at least one camera and lens parameter of the plurality of camera and lens parameters.

13. The method as set forth in claim 8, further comprising generating a graphical display of a scene in accordance with a digitally modeled camera and lens using the plurality of camera and lens parameters.

14. A method for modeling a digitally simulated camera and lens comprising:

receiving at least one initial camera and lens parameter of a plurality of camera and lens parameters;

receiving at least one other camera and lens parameter of the plurality of camera and lens parameters; and

selectively correcting the at least one other camera and lens parameter in view of the at least one initial camera and lens parameter.

15. The method as set forth in claim 14, wherein the plurality of camera and lens parameters are selected from the group comprising field of view, lens focus, focal length, depth of field, hyper focal focus, camera aperture and aspect ratio.

16. The method as set forth in claim 14, further comprising generating camera and lens parameters based upon camera and lens parameters selected from the group comprising the at least one initial camera and lens parameter and the at least one other camera and lens parameter.

17. The method as set forth in claim 14, further comprising generating a digital output representative of at least one camera and lens parameter of the

plurality of camera and lens parameters.

18. The method as set forth in claim 14, further comprising generating a graphical display of a scene in accordance with a modeled camera and lens using the plurality of camera and lens parameters.

19. A method for digitally simulating a digital camera and lens on a computing system comprising the steps of:

receiving input representative of at least one camera and lens parameter;

processing the input to produce calculated camera and lens parameters; and

outputting the calculated camera and lens parameters.

20. The method as set forth in claim 19, wherein the calculated camera and lens parameters comprise parameters not included in the input.

21. The method as set forth in claim 19, wherein the calculated camera and lens parameters comprise corrected lens parameters determined from the input.

22 ~~20.~~ The method as set forth in claim 19, wherein said receiving step comprises receiving input from an external camera and lens device.

23 ~~22.~~ The method as set forth in claim 19, wherein said receiving step comprises the step of receiving input values from a user operated device.

24 ~~23.~~ The method as set forth in claim 19, wherein the input comprises focal length and focus and the calculated camera and lens parameters comprise a true focal length that is determined as a function of the input focal length and focus.

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24. The method as set forth in claim 19, wherein the input comprises an input focal length and infinity focal length cut off and the calculated camera and lens parameters comprise a focal length that is determined as a function of the input focal length and infinity focal length cut off.

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25. The method as set forth in claim 19, wherein the input comprises an aspect ratio and aperture and the calculated camera and lens parameters are selected from the group comprising hyper focal focus, hyper focal distance, near focus and far focus, the calculated camera and lens parameters determined as a function of the aspect ratio and aperture.

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26. The method as set forth in claim 19, wherein the input comprises a desired circle of confusion and the calculated camera and lens parameters comprise a focus that is determined as a function of the desired circle of confusion.

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27. The method as set forth in claim 19, further comprising the steps of:

receiving reference objects;

inserting the reference objects in a field of view; and

updating the reference objects to be consistently in the field of view when changes to camera and lens parameters are effected.

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28. The method as set forth in claim 19, wherein said input comprises camera orientation data relative to a subject being viewed by the camera and lens, said processing step comprising the step of calculating the camera and lens parameters as a function of the camera orientation data.

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29. The method as set forth in claim 19, wherein the step of

processing comprises referencing a table of camera and lens parameters to determine calculated camera and lens parameters.

30. The method as set forth in claim 19, wherein the step of outputting comprises outputting graphical representations of at least a portion of the camera and lens parameters to a graphical display.

31. The method as set forth in claim 19, wherein the step of outputting comprises outputting numerical values representing at least a portion of the camera and lens parameters.

32. The method as set forth in claim 30, wherein said graphical representations show a point of view of a scene from a position not in a field of view defined by the camera and lens.

33. The method as set forth in claim 19, wherein the step of outputting comprises outputting numeric values representative of the camera and lens parameters to a real world camera and lens device.

34. A method for simulating a digital camera and lens on a computer generated display, said method comprising the steps of:

generating markers indicative of the optical characteristics of the camera and lens; and

generating on the display an image reflective of objects viewed through the camera and lens; and

generating on the display the markers relative to the image viewed through the camera and lens.

35. The method as set forth in claim 34, wherein the markers comprise markers representative of a hyper focal distance.

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36. The method as set forth in claim 34, wherein the markers comprise markers representative of the hyper focal focus of the lens.

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37. The method as set forth in claim 34, wherein the markers comprise markers representative of near and far limits of focus of the lens.

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38. The method as set forth in claim 34, wherein the markers are adjustable by a user.

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39. The method as set forth in claim 34, further comprising a user inputting an adjustment to at least one marker using a user input device, the marker adjusted based on the user input.

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40. The method as set forth in claim 39, wherein said step of said user inputting comprises said user moving a cursor using a cursor control device to move the at least one marker on the display.

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41. The method as set forth in claim 39, wherein said step of said user inputting comprises the step of said user inputting a value that indicates that the at least one marker is to be moved on the display.

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42. A method for simulating a digital camera and lens on a computer generated display, said method comprising the steps of:

generating reference charts to be used by the user;

generating on the display an image reflective of objects viewed through the lens; and

generating on the display the reference charts relative to the image viewed through the lens.

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43. The method as set forth in claim 42, further comprising the step of adjusting the size and placement of the reference charts in conjunction with a change of focal length such that a visible representation of the chart on the display remains constant to the user.

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44. A method for digitally modeling a digital camera and lens comprising the steps of:

setting a determined infinity distance from the camera lens to a predetermined value less than infinity; and

adjusting camera and lens parameters such that the determined infinity distance is not exceeded.

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45. The method as set forth in claim 44, wherein the step of adjusting adjusts far limits of focus not to exceed the determined infinity distance.

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46. The method as set forth in claim 44, wherein the determined infinity distance defines a photographic area of interest.

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47. A method for matching a first image taken by a first camera and lens and a second image generated on a computer system, said method comprising the steps of:

inputting a digital representation of the first image into the computer system;

inputting camera and lens characteristics of the first camera and lens;

generating a digital model of the first camera and lens on the computer system using the camera and lens characteristics input; and

generating the second image in the field of view of the modeled camera and lens.

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48. The method as set forth in claim 47, wherein the camera and lens

characteristics are selected from the group comprising field of view, lens focus, focal length, depth of field, hyper focal focus, camera aperture and aspect ratio.

49. The method as set forth in claim 47, wherein the first image input is generated by a real world camera and lens.

50. A hand held camera and lens calculation device comprising a processor configured to receive at least one camera and lens parameter of a plurality of camera and lens parameters and calculate at least one other camera and lens parameter of the plurality of camera and lens parameters.

51. The hand held camera and lens calculation device as set forth in claim 50, further comprising an output display for displaying values representative of at least a portion of the camera and lens parameters.

52. The hand held camera and lens calculation device as set forth in claim 50, further comprising a graphic output display for graphically displaying images representative of at least a portion of the camera and lens parameters.

53. The hand held camera and lens calculation device as set forth in claim 50, further comprising a user input device configured to receive user input of camera and lens parameters.

54. The hand held camera and lens calculation device as set forth in claim 50, further comprising an input port configured to receive input of camera and lens parameters from a coupled camera and lens device.

55. The hand held camera and lens calculation device as set forth in claim 50, wherein the camera and lens parameters are selected from the group

comprising field of view, lens focus, focal length, depth of field, hyper focal focus, camera aperture and aspect ratio.

56. The hand held camera and lens calculation device as set forth in claim 50, wherein the calculation comprises an adjustment of the at least one other camera and lens parameter in response to a change of the received camera and lens parameter.

57. The hand held camera and lens calculation device as set forth in claim 50, wherein the calculation comprises a generation of the at least one other camera and lens parameter using the received camera and lens parameter.

58. The hand held camera and lens calculation device as set forth in claim 50, wherein the calculation comprises and correction of the at least one other camera and lens parameter in view of the received camera and lens parameter.

59. A computer system comprising:

an input;

a display;

a processor coupled to the input and display and configured to receive from the input at least one camera and lens parameter of a plurality of camera and lens parameters, calculate at least one other camera and lens parameter of the plurality of camera and lens parameters and display camera and lens parameters on the display.

60. The computer system as set forth in claim 59, wherein said processor is configured to generate a graphical representation of camera and lens parameters on the display.

61. The computer system as set forth in claim 59, wherein said

processor is configured to generate a numeric representation of camera and lens parameters on the display.

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62. The computer system as set forth in claim 59, wherein the input comprises a port configured to be coupled to an external camera and lens device.

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63. The computer system as set forth in claim 59, wherein the input comprises a port configured to be coupled to a user input device.

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64. A computer readable medium comprising instructions, which when executed by a processing system, modeling a digitally simulated camera and lens comprising adjusting at least one camera and lens parameter of a plurality of camera and lens parameters in response to the adjustment of at least one other camera and lens parameter.

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65. The computer readable medium as set forth in claim 64, wherein the plurality of camera and lens parameters are selected from the group comprising field of view, lens focus, focal length, depth of field, hyper focal focus, camera aperture and aspect ratio.

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66. The computer readable medium as set forth in claim 64, further comprising instructions which when executed generate a digital output representative of at least one camera and lens parameter of the plurality of camera and lens parameters.

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67. The computer readable medium as set forth in claim 64, further comprising instructions which when executed, generate a graphical display of a scene in accordance with a modeled camera and lens using the plurality of camera and lens parameters, wherein the display is updated as camera and lens parameters are adjusted.

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68. A computer readable medium comprising instructions, which when executed by a processing system, model a digitally simulated camera and lens comprising:

receiving at least one initial camera and lens parameters of a plurality of camera and lens parameters; and

generating at least one other camera and lens parameter of the plurality of camera and lens parameters using the at least one initial camera and lens parameter.

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69. The computer readable medium as set forth in claim 68, wherein the at least one initial camera and lens parameter comprises camera and lens parameters reflective of a real world camera and lens parameter and the step of generating generates camera and lens parameters to match the real world camera and lens.

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70. The computer readable medium as set forth in claim 68, wherein the plurality of camera and lens parameters are selected from the group comprising field of view, lens focus, focal length, depth of field, hyper focal focus, camera aperture and aspect ratio.

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71. The computer readable medium as set forth in 68, further comprising instructions which when executed generate a digital output representative of at least one camera and lens parameter of the plurality of camera and lens parameters.

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72. The computer readable medium as set forth in claim 68, further comprising instructions which when executed generate a graphical display of a scene in accordance with a digitally modeled camera and lens using the plurality of camera and lens parameters.

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73. A computer readable medium comprising instructions, which when executed by a processing system, model a digitally simulated camera and lens comprising:

receiving at least one initial camera and lens parameter of a plurality of camera and lens parameters;

receiving at least one other camera and lens parameter of the plurality of camera and lens parameters; and

selectively correcting the at least one other camera and lens parameter in view of the at least one initial camera and lens parameter.

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74. The computer readable medium as set forth in claim 73, wherein the plurality of camera and lens parameters are selected from the group comprising field of view, lens focus, focal length, depth of field, hyper focal focus, camera aperture and aspect ratio.

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75. The computer readable medium as set forth in claim 73, further comprising instructions which when executed generate camera and lens parameters based upon camera and lens parameters selected from the group comprising the at least one initial camera and lens parameter and the at least one other camera and lens parameter.

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76. The computer readable medium as set forth in claim 73, further comprising instructions which when executed generate a digital output representative of at least one camera and lens parameter of the plurality of camera and lens parameters.

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77. The computer readable medium as set forth in claim 73, generate a graphical display of a scene in accordance with a modeled camera and lens using the plurality of camera and lens parameters.

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78. A computer readable medium comprising instructions, which when executed by a processing system, simulates a digital camera and lens on a computing system comprising:

receiving input representative of at least one camera and lens parameter;

processing the input to produce calculated camera and lens parameters; and

outputting the calculated camera and lens parameters.

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79. The computer readable medium as set forth in claim 78, wherein the calculated camera and lens parameters comprise corrected lens parameters determined from the input.

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80. The computer readable medium as set forth in claim 78, wherein the input comprises an aspect ratio and aperture and the calculated camera and lens parameters are selected from the group comprising hyper focal focus, hyper focal distance, near focus and far focus, the calculated camera and lens parameters determined as a function of the aspect ratio and aperture.

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81. The computer readable medium as set forth in claim 78, wherein the input comprises a desired circle of confusion and the calculated camera and lens parameters are selected from the group comprising near focus and far focus, said calculated camera and lens parameters determined as a function of the desired circle of confusion.

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82. The computer readable medium as set forth in claim 78, further comprising instructions which when executed,

receive reference objects,

insert the reference objects in a field of view, and

update the reference objects to be consistently in the field of view when

changes to camera and lens parameters are effected.

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83. The computer readable medium as set forth in claim 78, wherein said input comprises camera orientation data, said processing comprising calculating the camera and lens parameters as a function of the camera orientation data.

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84. The computer readable medium as set forth in claim 78, wherein outputting comprises outputting graphical representations of at least a portion of the camera and lens parameters to a graphical display.

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85. The computer readable medium as set forth in claim 78, wherein outputting comprises outputting numerical values representing at least a portion of the camera and lens parameters.

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86. The computer readable medium as set forth in claim 84, wherein said graphical representations show a point of view of a scene from a position not in a field of view defined by the camera and lens.

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87. A computer readable medium comprising instructions, which when executed by a processing system, simulate a digital camera and lens on a computer generated display comprising:

generating markers indicative of the optical characteristics of the camera and lens; and

generating on the display an image reflective of objects viewed through the camera and lens; and

generating on the display the markers relative to the image viewed through the camera and lens.

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88. A computer readable medium comprising instructions, which

when executed by a processing system, simulate a digital camera and lens on a computer generated display, comprising:

generating reference charts to be used by the user;

generating on the display an image reflective of objects viewed through the lens; and

generating on the display the reference charts relative to the image viewed through the lens.

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~~89.~~ The computer readable medium as set forth in claim ~~88~~, further comprising instructions which when executed adjust the size and placement of the reference charts in conjunction with a change of focal length such that a visible representation of the chart on the display remains constant to the user.

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~~90.~~ A computer readable medium comprising instructions, which when executed by a processing system, digitally model a digital camera and lens comprising:

setting a determined infinity distance from the camera lens to a predetermined value less than infinity; and

adjusting camera and lens parameters such that the determined infinity distance is not exceeded.

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~~91.~~ The computer readable medium as set forth in claim ~~90~~, wherein adjusting adjusts far limits of focus not to exceed the determined infinity distance.

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~~92.~~ The computer readable medium as set forth in claim ~~90~~, wherein the determined infinity distance defines a photographic area of interest.

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~~93.~~ A computer readable medium comprising instructions, which when executed by a processing system, match a first image taken by a first

camera and lens and a second image generated on a computer system, comprising:

inputting a digital representation of the first image into the computer system;

inputting camera and lens characteristics of the first camera and lens;

generating a digital model of the first camera and lens on the computer system using the camera and lens characteristics input; and

generating the second image in the field of view of the modeled camera and lens.

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~~94.~~ The computer readable medium as set forth in claim ~~93~~, wherein the camera and lens characteristics are selected from the group comprising field of view, lens focus, focal length, depth of field, hyper focal focus, camera aperture and aspect ratio.

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~~95.~~ The computer readable medium as set forth in claim ~~94~~, wherein the first image input is generated by a real world camera and lens.